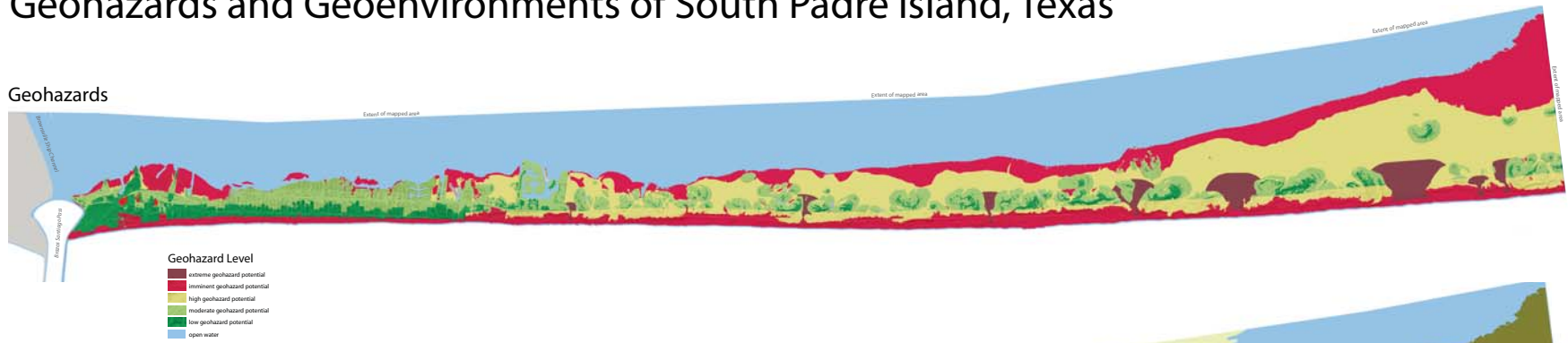
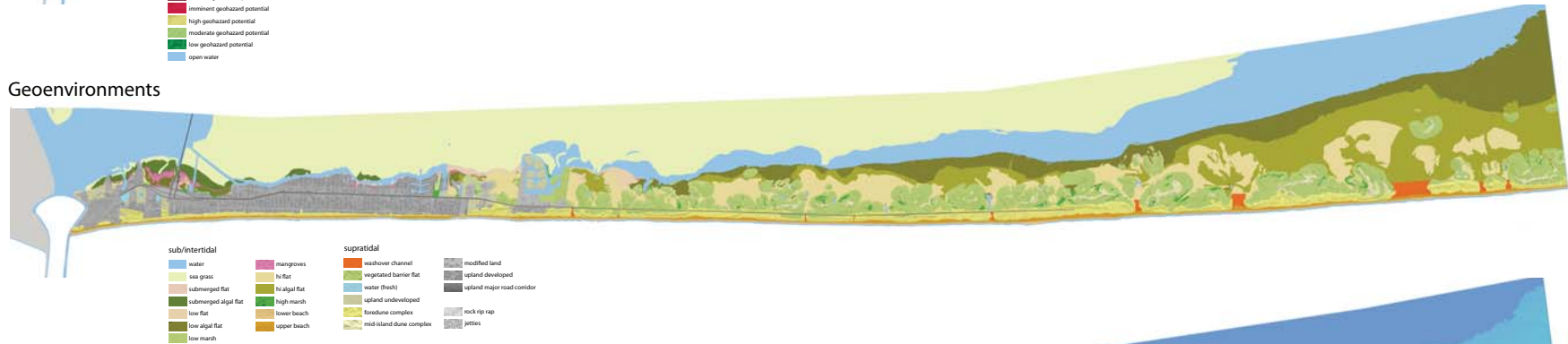


Geohazards and Geoenvironments of South Padre Island, Texas

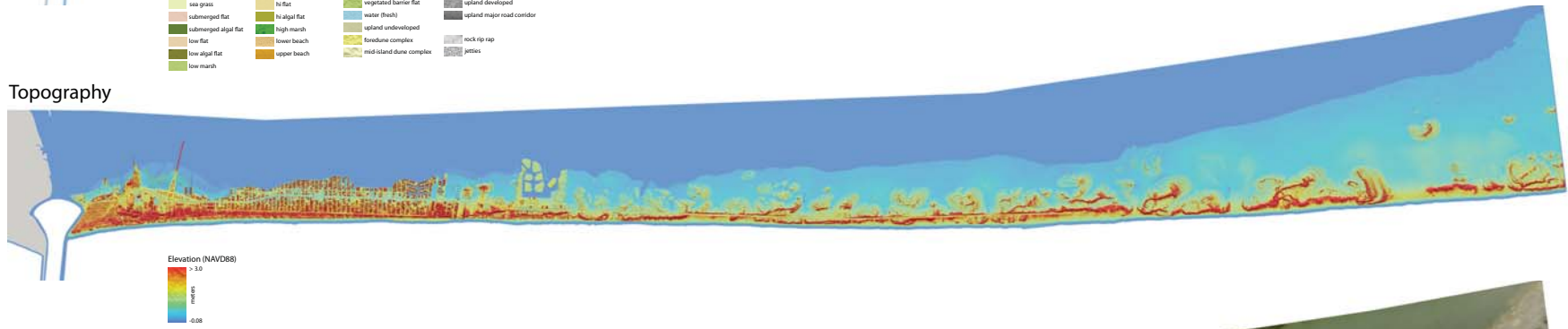
Geohazards



Geoenvironments



Topography



Photography



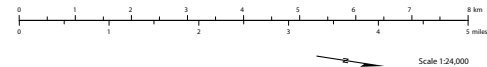
Geohazards
The entire 30-km long portion of South Padre Island depicted in the map is highly vulnerable to sea-level rise and tropical storms, but simply categorizing the entire island as a risky place to live would not help guide ongoing development. The Geohazards and Geoenvironments of South Padre Island, Texas shows areas that vary in their susceptibility to, and function for, mitigating the effects of geological processes. These processes include sea-level rise, erosion, storm-surge flooding, and washover. Areas mapped as having **extreme hazard potential** are storm washover channels that cut through foredunes. These areas are hazardous because of the high velocity flow and erosion that occurs in them, but also because their presence serves as a hydraulic "relief valve" during storm surge. Storm washover channels are also a pathway for delivering sediment to the landward side of the island, which helps maintain critical environments as sea level rises. Areas mapped as having **imminent hazard potential** include presently existing critical environments of regularly flooded estuarine wetlands, freshwater wetlands, and beach/foredune systems. Although foredunes on South Padre Island are some of the highest areas, their protective function is critical for mitigating geohazard impacts, thus they are given a relatively high geohazard rank. Areas of future critical environments are designated as having a **high hazard potential** and include uplands and high estuarine wetlands projected to become critical environments in 60 years. The distribution of future beach/foredune areas on the Gulf side of the island is estimated using historical shoreline change analysis coupled with the shore-normal width required for the full development of protective foredunes. Areas designated as having **moderate hazard potential** are uplands that are neither currently, nor are expected to become, critical environments during the next 60 years but are less than 1.5 meters in elevation causing them to be inundated during a typical tropical storm or category-one hurricane. Remaining upland areas have a **low hazard potential** because of their elevation greater than 1.5 meters and interior location to the island, making them overall less susceptible to geohazards. These areas include interior dunes and areas raised by humans.

Geoenvironments
The geoenvironments map depicts areas based on their geomorphology, geographic relationships, elevation, vegetation, processes of formation, and land-use characteristics. White et al. (2005) used 2002 aerial photography and field visits to map wetlands and aquatic habitats at a scale of 1:4,000. Wetlands were mapped in accordance with the classification by Cowardin et al. (1979). For the current map, the 2002 wetlands map was revised and upland delineations added using 2009 aerial photography, a 2009 lidar-derived digital elevation model, and field visits. The map is displayed with a topographic hill shade effect computed from the lidar digital elevation model.

Topography
The South Padre Island digital elevation model (DEM) was derived from lidar point data collected during two flights conducted on February 24 and 25, 2009. The DEM has a horizontal resolution of 1 meter and a vertical resolution of 0.01 meter. It is illustrated here with color representing elevation and a hill-shade.

Photography
The 0.5-meter 2008/2009 digital orthophoto quarter quads (DOQQ) were collected through a partnership between the Texas Orthoimage Program (TOP) and the USDA National Agriculture Imagery Program (NAIP).

References
Cowardin, L.M., Carter, V., Gotel, F.C., and LaRoc, E.T., 1979. Classification of wetlands and deepwater habitats of the United States: Washington, D.C., U.S.A., U.S. Department of Interior, Fish and Wildlife Service, p. 131.
White, W.A., Tremblay, T.A., Waldinger, R.L., Hegner, T.L., Cairan, T.A., 2005. Status and Trends of Wetland and Aquatic Habitats on Barrier Islands, Freeport to East Matagorda Bay, and South Padre Island. The University of Texas at Austin, Bureau of Economic Geology, Austin, Texas.



A Report of the Texas Coastal Coordination Council pursuant to National Oceanic and Atmospheric Administration Award No. NA68ND04190458. This map was created by the Coastal and Marine Geospatial Lab of the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University - Corpus Christi. The Bureau of Economic Geology at The University of Texas at Austin conducted the lidar survey and processed the data to produce the digital elevation model.

